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ABSTRACT

Part of an eight-module, graduate level, competency-based curriculum to prepare specialists in vocational education curriculum development, this module provides information, activities, and experienced designed to develop expertise in writing goal statements, performance and instructional objectives, and in developing instructional plans. Preceded by a pretest, posttest, and glossary of terms, the learning activities and instructional objectives are organized according to three major performance objectives which relate to establishing educational priorities, writing and sequencing performance objectives, and completing occupational and instructional analyses as part of the instructional plan. These major performance objectives are subdivided into several instructional objectives which are accompanied by related learning activities. The learning activities include fact sheets, worksheets, activity sheets, and keys. A self-instructional module is appended which provides information and learning experiences for writing behavioral objectives in the six levels of the cognitive domain--knowledge, comprehension, application, analysis, synthesis, and evaluation. A bibliography is also included. (NJ)

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ED133561

CURRICULUM

for

GRADUATE PROGRAM

to Prepare

VOCATIONAL EDUCATION CURRICULUM SPECIALISTS

MODULE 1

Developing Curriculum: Goals, Objectives & Instructional Plans

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
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Vocational Education Amendments of 1968, Public Law 90-576

The content of this module was used as a part of a graduate course in Vocational Technical Education at Washington State University. The effectiveness of the curriculum material was evaluated on the basis of:

1. Performance data from pre and post tests and other evaluative techniques used in the course.
2. Use of a Curriculum Evaluation Questionnaire which was developed, administered and summarized by the third party evaluator, Northwest Regional Education Laboratory. This questionnaire provided a faculty and student rating of: individualization of the curriculum, choice of learning settings and quality of curriculum.

Revisions in final drafts utilized these evaluations.

COMPETENCY

THE VOCATIONAL EDUCATION CURRICULUM SPECIALIST WILL DEMONSTRATE THE ABILITY TO DEVELOP APPROPRIATE PROGRAM GOALS, PERFORMANCE AND INSTRUCTIONAL OBJECTIVES, AND INSTRUCTIONAL PLANS AND TO ASSIST THE CURRICULUM DEVELOPMENT TEAM IN THIS PROCESS.

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INTRODUCTION

Purpose

This module is designed to provide information, activities, and experiences which will assist the vocational curriculum specialist to gain additional skill in establishing goals and writing goal statements, writing performance and instructional objectives for a unit of instruction, and developing instructional plans to accomplish the performance objectives.

Specific skills in instructional plans are further developed in Module 4, Instructional Strategies; Module 5, Instructional Materials; and Module 6, Evaluation.

Rationale

Why do we have vocational education programs? What are programs in schools, community colleges, or vocational-technical institutes trying to accomplish? The answers to these questions are usually stated in terms of goals. As education "architects," we deliberately and intentionally structure objectives and learning activities for the learner which are designed to accomplish these goals.

The establishment and articulation of the goals of a program and the translation of these goals into an instructional plan of objectives, learning experiences, and evaluation is the task of curriculum makers. Teachers, advisory groups from business, industry and labor, administrators, policy boards, and at times, learners contribute to processes of developing curriculum. The Vocational Education Curriculum Specialist has complete understanding of the component parts of a curriculum and the procedures for building curriculum and therefore can serve as consultant, leader, or coordinator in developing curriculum.

To be effective in curriculum development, one must be able to define and

write goal statements. From goal statements, objectives are written in behavioral or performance terms and instructional plans are developed to enable students to meet the objectives. The design of this module is to develop expertise in these three areas.

Assumptions

Four assumptions seem inherent in the content presented via this module.

1. It is assumed that educators have reasons for the particular experiences they offer to students.
2. It is assumed that these reasons can be written as goal statements.
3. It is assumed goal statements can be broken into objectives that are manageable.
4. A flexible, but clearly defined, complete instructional plan with a sequence of learning activities is a means for reaching behavioral objectives of a vocational training program.

Overview

This segment of the curriculum for preparing Vocational Education Curriculum Specialists is considered Module 1 and it is recommended that it precede all other modules (except the Introductory Module which is provided as review). Placement of most other modules in this program can be adjusted to fit the structure of a particular institutional program, but this module should always be Module 1.

The module incorporates three areas of curriculum theory and knowledge as indicated by the three performance objectives which are related to:

- the process of establishing educational goals,
- performance and instructional objectives in behavioral terms, and
- instructional plans based on occupational analysis.

The highly cognitive nature of the performance objectives makes it possible to use many self-instructional devices and so, many of the learning activities are presented in this form.

However, it is not recommended that the self-instructional activities be carried on without group discussions moderated by an informed mentor, an instructor with depth of background in curriculum theory. The instructor should understand the wide variety of approaches to curriculum planning which have been promoted, have knowledge of the historical development of curriculum theory and be familiar with current curriculum research. It is also important that the instructor understand all vocational education fields and recognize reasons for variations in planning curriculum for these various fields.

MODULE PREREQUISITES

It is expected that vocational educators engaged in graduate level study of curriculum planning will have had some experience in developing and adapting plans for courses, units, and lessons in at least one occupational field. Terms included on the list, given at the beginning of the module, should be familiar to the student.

Each student is expected to have had an opportunity to complete the Introductory Module. Not all will need to carry out the learning experiences in the Introductory Module, but should be given this opportunity before beginning this module.

The ability to communicate in writing and comprehension of the overall purpose of vocational education is essential.

PRETEST AND POSTTEST INSTRUCTIONS

The test instrument which follows has items designed to measure the first two performance objectives--those related to establishing goals and writing behavioral objectives. Performance Objective 3 can be realized best by judging the "products" of the student. Products will result from the learning activities and these need to be judged by the instructor and/or other students who should give immediate feedback to the student. In addition, each student will plan a "CARRIER PROJECT." Directions are to be given at the beginning of the module for this project in order for students to develop the project as they progress through the unit. Projects are to be as realistic as possible with students planning curriculum materials which they can use in their own professional positions, or which would be useful in program visitations.

PRETEST AND POSTTEST

A. To complete the following, refer to a course you have recently taught, e.g., basic woodworking for college freshmen, community college horticulture, high school distributive education.

1. State, in writing, a general competency students in this course would be expected to develop.

2. Write a performance objective related to the competency stated in No. 1 for one part or unit of that course.

3. Write an instructional or enabling objective for a specific lesson planned to develop the performance objective stated in No. 2.

B. Various taxonomies of educational objectives have been devised to classify objectives. Classify each of the following objectives by writing "cognitive," or "psychomotor," or "affective" in the blanks at the left. Select one classification only for each objective.

____1. Given plane iron with correct level and oiled sharpening stone, the student will hone the plane to produce a wire edge.

____2. The student will demonstrate acceptance of the importance of using protective equipment by always using a face shield when operating power equipment.

____3. Given a hi-low bed and basic set of hospital linens, the student will make up a hospital bed which will be comfortable and convenient for the patient, using minimum amount of time and energy.

____4. Given a monthly report of four (4) pages in a revised, typed draft, the student will type four (4) duplicating stencils on an electric, standard typewriter, without error, in 40 minutes.

____5. In supervision of children 3-5 years of age from a wide variety of family backgrounds, the student will select the kind of direction and assistance needed for each child.

____6. The student will cut into six (6) equal pieces, a piece of 1' x 2" x 16' pine, using a radial arm saw.

____7. Given a soil auger and Sudbury soil test kit, the student will determine the amount of nitrogen, phosphorous, and potash needed to produce maximum yield of corn on a gently rolling 20 acre upland field with normal drainage.

____8. The student will select and set up equipment and supplies needed for a dentist to restore an anterior cavity.

____9. In a contact with a customer seeking a replacement part, the student will elicit all the information needed to order the part.

Pretest Key

A. The A part of this pretest will require the judgment of the instructor in determining the level of achievement. A 1-5 scale is recommended for rating the responses on each of the following criteria:

- Responses 1, 2, and 3 related to occupational responsibilities and tasks,
- Responses 1, 2, and 3 written in terms of learners' behavior--not subject matter nor in terms of what the instructor will do,
- Response 1, 2, and 3 show sequence of general to specific,
- Response 3 includes observable behavior, conditions under which behavior is to be demonstrated and the criteria of performance.

The following definitions and examples may help the instructor in rating responses.

1. Competency. A broad statement of an ability required in a particular occupation. Example: Demonstrates ability to interview patients and carry out all procedures needed in admitting them to a hospital.

2. Performance Objective. A competency stated in terms of specified tasks. Level of performance usually indicated. Example: Elicits from patient all information needed for hospital records.

3. Instructional Objective. Demonstrate ability to secure, with 100% accuracy, all personal and insurance information needed for hospital admission from a 15 year old boy who has been accidentally injured.

B. Most objectives have some elements of cognitive, affective and psychomotor behavior. A discussion of differences of opinion regarding the key may be beneficial. The key is based on primary type of behavior indicated.

1. Psychomotor
2. Affective
3. Psychomotor
4. Psychomotor
5. Cognitive
6. Psychomotor
7. Cognitive
8. Cognitive
9. Cognitive

Directions for Carrier Project

At the beginning of the module, each student is to select a Carrier Project. This is to be as realistic as possible--one that can be used. Plans for the project are to be discussed and approved by the instructor.

1. First, select for planning a course, unit of a course, or a short training session to plan. This may be a vocational course for any level. For example: agri-business course for high school level, technical institute course in electronics, interdisciplinary course in consumer education for an adult and continuing education program, inservice series for midmanagers, intensive refresher course for medical technicians. Those who have had experience as teacher educators may use a course or unit for a teacher education program.

   Describe briefly the setting and clientele of the instructional plan to be developed.
2. As you proceed through learning activities for Performance Objective 1, develop goals for your course or unit. Indicate how these are related to the goals of the overall program and to stated goals.
3. Write the performance objectives of the course or unit in behavioral terms. The first draft is to be finished by the time you have completed Performance Objective 2.
4. a. Conduct an occupational analysis related to your course or unit. Revise performance objectives as may be indicated by the analysis.

   b. Develop a course outline which includes course goals, unit

or lesson titles, performance objectives for each unit or lesson, and the learning activities.

The Carrier Project will be evaluated using the following criteria:

EVALUATIVE CRITERIA FOR CARRIER PROJECT

Criteria	Contained in Guide: Yes	No/Not included	Needs improvement
I. PROGRAM GOALS: Consistent with needs (student and employment)			
Goals established			
Behavioral objectives designed to meet goals			
Consistent with level and abilities of students			
Relevant attitudes, knowledge, and skills to jobs			
Feasible within time and budget			
Statements clear and understandable to students, teachers, administrators			
Establishes learning directions and emphases			
Consistent with stated philosophy			
Consistent with available resources			
Describes terminal behavior			
II. CONTENT (Curriculum): Occupational analysis accomplished			
Course outline completed			
Clearly relates to course goals			
Valid up-to-date materials			
Includes general principles as opposed to facts			
III. LEARNING ACTIVITIES: Safe with adequate supervision			
Effective for meeting objectives			
Variety for student interest			

Criteria	Contained in Guide		
	Yes	No/Not included	Needs improvement
Balance in modes of learning			
Flexible to meet student needs			
Consistent with "real world" activities			
Organized in logical progression			
Flexible in school setting			

GLOSSARY OF TERMS

GOAL - a desired outcome from an instructional program.

PERFORMANCE OBJECTIVE - observable behaviors which are to be achieved and demonstrated by the learner. In vocational education these behaviors are those needed for successful performance in an occupation.

LEARNING ACTIVITY - an experience involving one or more students which enables them to practice and/or demonstrate a pre-specified performance or instructional objective.

INSTRUCTIONAL OBJECTIVE - a specific learner behavior which is one aspect of the behavior indicated in the performance objective.

CONDITIONS - the element of a behavioral objective that states those circumstances under which the learner must perform or when the behavior will occur.

STANDARD OF PERFORMANCE - the element of a behavioral objective stated in terms of the minimum acceptable performance; a criterion for performance.

OBSERVABLE BEHAVIOR - the element of a behavioral objective that contains a word, generally a verb, that indicates how the learner is to perform.

UNIT - in curriculum planning refers to a segment of a course; an entity identified by the homogeneity of content.

PERFORMANCE OBJECTIVE 1

Explain, illustrate and use the processes for establishing educational priorities.

Instructional Objective 1.1

The Vocational Education Curriculum Specialist will define, describe, and illustrate the various levels and kinds of goal statements.

Explanation:

Although the word "goal" is used by many education, business and professional people, it is difficult to describe the concept. It is a term used to describe many hoped for or planned outcomes, but the exact attributes of this concept are not as easy to define as instructional objectives written in performance terms. Goals are stated desired outcomes. How abstract should goal statements be? Should goal statements include a target audience? Should the goal statement include criteria?

Goals are written for many levels. There are national goals, such as those proposed by professional organizations, national agencies, and even legislative bodies. There are state goals proposed by the same groups. There are subject matter goals. There are individual class goals. There are district goals and even teacher and student goals.

Therefore, our first task is to become familiar with the many dimensions of goals. From a particular point of view the Vocational Education Curriculum Specialists must develop an operational definition of the curricular meaning of the term "goal" so that they can assist vocational educators in planning and developing vocational curricula.

Learning Activity 1.1-a

In writing, explain if the following analogy points to the need for goals?

"A ship in the ocean will be tossed at random unless it has someone at the helm with a destination in mind."

Using this analogy and the sources of material listed below, write a paragraph substantiating the need for goals.

References:

Davis, Robert H., and Yelon, Stephen L. Learning System Design. New York: McGraw Hill, 1974. Chapters 2 and 3.

Mager, Robert. Goal Analysis. Belmont, CA: Fearon Publishers, 1972.

McAshan, H. H. The Goal Approach to Performance Objectives. New York: Harper and Row, 1970. Chapters 1-5.

Learning Activity 1.1-b

Using the sources listed in Activity 1.1-a, develop a definition of the concept "goal." Be sure to identify those distinguishing features that are dominant and necessary, and those that are secondary and not essential.

Worksheet - DEFINITION OF GOALS

DEFINITION:

_____

_____

_____

_____

Essential Features: (Explain why these are essential)

Rationale of Essential Features: (Explain why these should be considered)

Learning Activity 1.1-c

Identify or develop vocational education goals for the levels listed on the following worksheet. Be sure that the goal you select or develop is consistent with your definition of a goal statement.

Before writing goal statements, you may want to refer to examples given immediately following the worksheet.

Worksheet for Learning Activity 1.1-c - LEVELS OF GOALS FOR VOCATIONAL EDUCATION

National -

State -

Professional Organizations -

For one Vocational Education Field -

School District -

School Building -

Course -

Unit -

Lesson -

EXAMPLES OF GOAL STATEMENTS FOR LEARNING ACTIVITY 1.1-c

(Goal Statements below are excerpts from actual lists of goals.)

National Goals of Future Farmers of America [1]

The primary aim of the Future Farmers of America is the development of agricultural leadership, cooperation, and citizenship. The specific purposes for which this organization was formed are as follows:

1. To develop competent, aggressive, rural and agricultural leadership.
2. To encourage members in the development of individual farming programs and establishment in agricultural careers.

National Vocational Industrial Clubs of America [2]

The primary aim of the National Vocational Industrial Clubs of America is to:

1. relate school experiences to a young person's personal search for meaning, identity and achievement.
2. encourage excellence in scholarship, craftsmanship, leadership, and personal development through a national achievement program and national competitive activities.

---

[1] Future Farmers of America, "The FFA Organization," Alexandria, VA.

[2] Vocational Industrial Clubs of America, "Discovering VICA," Falls Church, VA.

Washington State Goals[3]

In 1971, the Washington State Board of Education identified the mission of the common schools.

That mission is "to assure learning experiences to help all children develop skills and attitudes fundamental to achieving individual satisfaction as responsible, contributing citizens."

As a result of the process of education, each student should:

1. have the basic skills and knowledge necessary to seek information, to present ideas, to listen to and interact with others, and to use judgment and imagination in perceiving and resolving problems.
2. be prepared for his next career step.

Oregon State Board of Education Goals for Elementary and Secondary Education[4]

LEARNER:

To develop the basic skills of reading, writing, computation, spelling, speaking, listening, and problem-solving; and to develop a positive attitude toward learning as a lifelong endeavor.

PRODUCER:

To learn of the variety of occupations; to learn to appreciate the dignity and value of work and the mutual responsibilities of employees and employers; and to learn to identify personal talents and interests, to make appropriate career choices, and to develop career skills.

---

[3] Office of Superintendent of Public Instruction, Olympia, WA.

[4] Office of Superintendent of Public Instruction, Salem, OR.

Everett School District Goals

The goals of the Everett educational program are designed to develop in each student:

1. recognition of and respect for moral, ethical and spiritual values.
2. analytical, critical and constructive thought processes necessary to make wise individual and group decisions.

Fremont Unified School District Goals

It is the responsibility of the Fremont Unified School District to provide opportunity for each student:

1. to develop an understanding of the rights, privileges, and obligations of citizens and their constructive application in a representative democracy.
2. to develop creative, critical, and independent thinking in order to understand, participate, and contribute intelligently and questioningly in our society.

A. C. Davis Senior High School Goals (1972)

The process of education should:

1. assist students in learning how to make decisions, taking into account the alternatives and the consequences of those decisions.
2. assist students in learning about our heritage and traditions, as well as how to handle their growing knowledge in a society of rapid change.

A. C. Davis Senior High School
Department of Home and Family Life Goals

The Department of Home and Family Life should provide educational experiences designed:

1. to have students become more competent as individuals, family members and wage earners, now and in the future.
2. to provide society with better prepared individuals, family members and wage earners.

Instructional Objective 1.2

Write goal statements in several fields of vocational education for different levels of planning, from national programs to individual courses.

Learning Activity 1.2-a

It is also important and necessary for a curriculum specialist to be able to write goal statements in all areas of vocational education. Choose two areas outside of your area of expertise and write goal statements from the national level to the class level. Explain how each goal is different from the goal statement immediately above or immediately below. Do this activity on Worksheet 1.2-a.

Worksheet for Learning Activity 1.2-a - A SPECIFIC VOCATIONAL EDUCATIONAL FIELD (e.g., Health Occupations, Distributive Education)

National -

Explanation:

State -

Explanation:

Professional Organizations (state or national) -

Explanation:

Subject Matter -

Explanation:

School District -

Explanation:

Instructional Objective 1.3

Develop goal statements from needs assessment information.

Explanation

Skill in making a needs assessment and utilizing data from studies of manpower needs, needs of learners, and analysis of occupations is a competency included in another module. In some programs the needs assessment module and this module may be taught together and some instruction in needs assessment would precede this module.

The development of goals is more than a writing exercise. It is a process of getting a group of people to think through a plan for accomplishing a task and getting a commitment from individuals to work toward accomplishment of this task.

Learning Activity 1.3-a

A problem to be solved by a Vocational Education Curriculum Specialist is presented on the following page. Study the problem, gather the facts from the assessment of needs and give your recommendations for a solution in terms of goals as directed in the letter. Remember the goal definition you developed in Performance Objective 1.

If working in a group, it would be advisable to divide the task, such as the writing of goal statements, and then circulate a rough draft.

Remember, you are trying to develop goal statements based on needs assessment data. This is more than a writing process, it is also a thinking process.

Lincoln Vocational Technical Institute

Fictitiousville, U.S.A.

TO: Mr. You, Vocational Education Curriculum Specialist

FROM: Bruce Smith, Director

SUBJECT: Reduction in Budget for Next Year

In view of our eroding tax base and the recent failure of our special levy for operation and maintenance, the school board has informed me that the vocational budget will be cut by 10% next year. I am asking you to run a needs assessment and develop alternatives for making the necessary program reductions.

At present we have a budget of $191,100 and are operating eight programs. A reduction of $19,100 must be made. It is no longer possible to make cuts in clerical staff, travel, and miscellaneous areas. We must reduce the size of programs at our school.

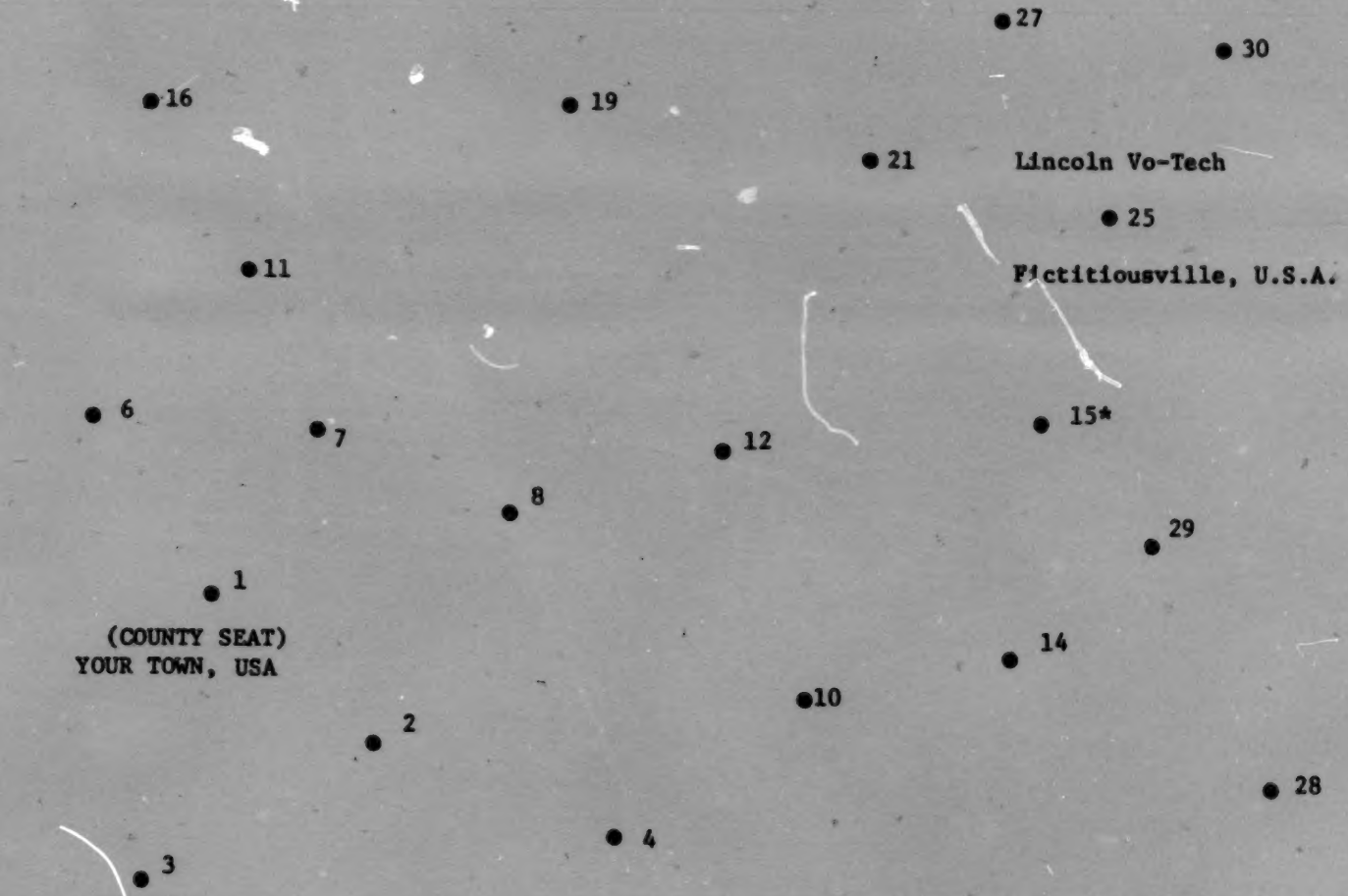
In preparation for the school board meeting, in two months, I want you to prepare a plan for making the necessary reductions. Alternate plans are desirable so that many viewpoints can be considered. Justify your plan by listing the criteria used in making your decision and present your final plans in goal statements for our school for next year.

The following sheets are information items collected by Mr. You for determining a plan and arriving at goal statements for next school year.

After scrutinizing the Fact Sheets, write your plan and justification factors on Worksheet 1.3-a(1). On Worksheet 1.3-a(2) state the new goals for next year's program as a result of your decisions from the needs assessment data.

Fact Sheet 1 for Learning Activity 1.3-a

SUBJECT: LOCATION OF VOCATIONAL-TECHNICAL INSTITUTES NEAR FICTITIOUSVILLE, U.S.A.



*LOCATION #15 - 25 miles from Fictitiousville, U.S.A.

Fact Sheet 2 for Learning Activity 1.3-a

SUBJECT: VOCATIONAL EDUCATION PROGRAMS AT JEFFERSON SECONDARY VOCATIONAL CENTER

Program	Length	Enrollment
Nurses' Aide	36 weeks	15
Construction	36 weeks	12
Electronics	36 weeks	14
Model Office	36 weeks	25
Horticulture	36 weeks	15

NOTE: Location of Jefferson Secondary Vocational Center is #15 (on Fact Sheet #1), 25 miles from Fictitiousville, U.S.A.

Fact Sheet 3 for Learning Activity 1.3-a

SUBJECT: VOCATIONAL EDUCATION
PROGRAM AT JACKSON HIGH SCHOOL

H.S. Program	Length	Enrollment
Vocational Agriculture I	36 weeks	15
Vocational Agriculture II	36 weeks	14
Vocational Agriculture III	36 weeks	17
Vocational Agriculture IV	36 weeks	12
Agricultural Mechanics	18 weeks	15
Home Economics I	36 weeks	20
Home Economics II	36 weeks	24
Home Economics III	36 weeks	26
Home Economics IV	36 weeks	19
Horticulture	18 weeks	16
General Merchandising	36 weeks	22
Typing and Shorthand	36 weeks	25
Business Accounting	36 weeks	20
Adult Programs		
Adult Farm Management	12 months	20
Secretarial	12 sessions	15

NOTE: Location of Jackson High School is at #19 on Fact Sheet 1, 40 miles from Fictitiousville, USA.

Fact Sheet 4 for Learning Activity 1.3-a

SUBJECT: VOCATIONAL EDUCATION
PROGRAMS AT FRANKLIN HIGH SCHOOL

H.S. Program	Length	Enrollment
Exploring Agriculture	36 weeks	16
Crop and Soil Technology	36 weeks	15
Animal Technology	36 weeks	15
Farm Management and Ag. Bus.	36 weeks	14
Family Living	36 weeks	20
Child Care	36 weeks	15
Consumer Homemaking	36 weeks	22
Auto Mechanics	36 weeks	15
Adult Programs		
Agricultural Mechanics	10 sessions	30
Family as Consumer	10 sessions	25
Adult Clerical	10 sessions	13

NOTE: Location of Franklin High School is #29 on Fact Sheet 1, 48 miles from Fictitiousville, USA.

Fact Sheet 5 for Learning Activity 1.3-a

SUBJECT: POST-SECONDARY VOCATIONAL APPLICANTS
PLACEMENT AND COST AT LINCOLN VOCATIONAL-TECHNICAL INSTITUTE
FOR TWO-YEAR PERIOD

Program	No. of Applicants	Total Enrollment	% Placement	Cost
Accounting	71	41	79	$19,300
Clerical	79	75	86	24,100
Commercial Cooking	24	20	95	30,400
Fashion Merchandising	37	29	76	11,900
Machine Shop	73	39	90	17,200
Medical Secretary	25	25	100	17,200
Practical Nursing	69	56	89	28,600
Secretarial	76	62	92	21,600

Fact Sheet 6 for Learning Activity 1.3-a

SUBJECT: AVERAGE ANNUAL OCCUPATIONAL DEMAND* FOR TWENTY-FIVE JOB GROUPS IN THE STATE

	Job Group	Demand (low, medium, high)
1.	Accounting-data occupations (e.g. bookkeeper, cashier, computer operator, file clerk, telephone operator)	High
2.	Agribusiness occupations (e.g. feed salesman, florist, tractor mechanic, grounds keeper, fire warden)	Medium
3.	Agricultural production occupation (e.g. truck farmer, dairy farmer, poultry laborer)	Low
4.	Air transportation occupations (e.g. stewardess, ticket agent, navigator, aircraft mechanic)	High
5.	Audio-visual occupations (e.g. photographer, engraver, broadcaster, printer)	Medium
6.	Building trades occupations (e.g. carpenter, electrician, bricklayer, painter, plumber)	Medium
7.	Child care and education occupations (e.g. nursemaid, teacher's aide, child care attendant)	Medium
8.	Metal working occupations (e.g. welder, sheetmetal worker, machinist, tool and die maker)	High
9.	Community service occupations (e.g. fireman, policeman, safety inspector, sanitation worker)	Medium
10.	Consumer-homemaking occupations (e.g. child care, food and nutrition, home furnishing)	Medium
11.	Electricity-electronics occupations (e.g. appliance repairman, electrician, instrument tester, meterman)	Medium
12.	Entertainment occupation (e.g. television salesman, backstage hand, sound and lighting technician, vocal entertainer)	High
13.	Environment occupations (e.g. water quality technician, air pollution technician, sewage plant technician)	Medium
14.	Fashion and apparel occupations (e.g. dry cleaning assistant, clothing alterations, seamstress)	Medium
15.	Foods occupations (e.g. restaurant cook, waiter or waitress, food processing worker)	High
16.	Health occupations (e.g. nutrition aide, health aide, nurse, dental laboratory technician)	High
17.	Hotel-Motel-Housing occupations (e.g. bellman, maid, front office clerk, manager)	Medium
18.	Insurance-finance occupations (e.g. insurance salesman, tax specialist, finance assistant)	Medium
19.	Journalism occupations (e.g. reporter, editor, circulation staff)	Medium
20.	Land transportation occupations (e.g. truck driver, auto mechanic, auto-body man, loader, service station attendant)	Low
21.	Marine occupations (e.g. fisherman, seafood harvester, sailor)	Low

22.	Office occupations (e.g. secretary, typist, keypunch operator)	High
23.	Personal service occupations (e.g. health club assistant, cosmetics sales, cosmetologist)	Medium
24.	Recreation and tourism occupations (e.g. guide, camp counselor, golf course staff, travel agency staff)	Medium
25.	Sales and marketing occupations (e.g. salesman, stockman, sales clerk, display assistant)	Medium

---

*"Average Annual Occupational Demand" means the number of positions of average annual growth and average annual replacement for the job categories.

Low - 1 to 1500
Medium - 1501 to 3500
High - 3501 to 6500

Fact Sheet 7 for Learning Activity 1.3-a

SUBJECT: JOB TRAINING INTEREST OF RESIDENTS IN THE STATE

Population

Want Job Training	16%
Do Not Want Job Training	84%

	Job Group	State
1.	Accounting-data occupations (e.g. bookkeeper, cashier, computer operator, file clerk, telephone operator)	12.8%
2.	Agribusiness occupations (e.g. feed salesman, florist, tractor mechanic, grounds keeper, fire warden)	2.2
3.	Agricultural production occupation (e.g. truck farmer, dairy farmer, poultry laborer)	1.6
4.	Air transportation occupations (e.g. stewardess, ticket agent, navigator, aircraft mechanic)	3.5
5.	Audio-visual occupations (e.g. photographer, engraver, broadcaster, printer)	6.3
6.	Building trades occupations (e.g. carpenter, electrician, bricklayer, painter, plumber)	6.7
7.	Child care and education occupations (e.g. nursemaid, teacher's aide, child care attendant)	6.4
8.	Metal working occupations (e.g. welder, sheetmetal worker, machinist, tool and die maker)	3.9
9.	Community service occupations (e.g. fireman, policeman, safety inspector, sanitation worker)	3.2
10.	Consumer-homemaking occupations (e.g. child care, food and nutrition, home furnishing)	4.6
11.	Electricity-electronics occupations (e.g. appliance repairman, electrician, instrument tester, meterman)	4.5
12.	Entertainment occupation (e.g. television salesman, backstage hand, sound and lighting technician, vocal entertainer)	2.7
13.	Environment occupations (e.g. water quality technician, air pollution technician, sewage plant technician)	2.3
14.	Fashion and apparel occupations (e.g. dry cleaning assistant, clothing alterations, seamstress)	1.8
15.	Foods occupations (e.g. restaurant cook, waiter or waitress, food processing worker)	1.6
16.	Health occupations (e.g. nutrition aide, health aide, nurse, dental laboratory technician)	8.8

17.	Hotel-Motel-Housing occupations (e.g. bellman, maid, front office clerk, manager)	1.5
18.	Insurance-finance occupations (e.g. insurance salesman, tax specialist, finance assistant)	1.5
19.	Journalism occupations (e.g. reporter, editor, circulation staff)	3.7
20.	Land transportation occupations (e.g. truck driver, auto mechanic, auto-body man, loader, service station attendant)	2.5
21.	Marine occupations (e.g. fisherman, seafood harvester, sailor)	0.7
22.	Office occupations (e.g. secretary, typist, keypunch operator)	6.8
23.	Personal service occupations (e.g. health club assistant, cosmetics sales, cosmetologist)	1.9
24.	Recreation and tourism occupations (e.g. guide, camp counselor, golf course staff, travel agency staff)	4.5
25.	Sales and marketing occupations (e.g. salesman, stockman, sales clerk, display assistant)	3.9

Fact Sheet 8 for Learning Activity 1.3-a

SUBJECT: SECONDARY VOCATIONAL PROGRAMS AND PLACEMENT RATES IN THE STATE

	PROGRAM	NUMBER OF PROGRAMS	PLACEMENT RATE (%)
1.	Accounting	24	60
2.	Agri-business	6	91
3.	Aircraft Mechanics	5	42
4.	Architectural Drafting	9	39
5.	Audio-visual Technology	3	78
6.	Auto Body Repair	16	53
7.	Automotive	34	41
8.	Automotive Machinist	2	54
9.	Bakery Procedures	5	75
10.	Bank Teller	8	84
11.	Bricklaying	4	59
12.	Broadcasting	4	35
13.	Cabinetmaking	7	78
14.	Carpentry	13	52
15.	Chefs, Cooks and Food Mgmt.	18	68
16.	Child Development Asst.	8	34
17.	Clerical Training	28	57
18.	Commercial Art	4	68
19.	Const/Mech. Trades	7	96
20.	Construction Worker	5	40
21.	Cosmetology	22	53
22.	Custodial Worker	2	98
23.	Data Processing	19	86
24.	Dental Assistant	11	93
25.	Diesel Mechanics	16	68
26.	Electronics	22	64
27.	Equipment Parts and Sales	9	81
28.	Farm Management	14	76
29.	Fashion Merchandising	12	58
30.	Machine Shop	19	81
31.	Maintenance Mechanic	6	74
32.	Marine and Small Eng. Mech.	15	84
33.	Mech. Drafting and Design	17	50
34.	Medical Clerical	12	87
35.	Medical Secretarial	24	59
36.	Nursery/Landscape Tech.	10	61
37.	Nurses Aide or Orderly	27	79
38.	Plastic Injec. Mold. Tech.	3	58
39.	Power and Home Elec.	21	83
40.	Practical Nursing	27	87
41.	Printing and Graphic Arts	16	71
42.	Purch. and Inventory Mgmt.	2	38
43.	Sales and Business Mgmt.	13	89
44.	Secretarial Training	34	80
45.	Service Station Mech.	3	98
46.	Sheet Metal	6	67
47.	Upholstering	8	37
48.	Waiter/Waitress	4	87
49.	Welding	19	53

Worksheet 1.3-a(1)

NAME_____

PLAN AND JUSTIFICATION SHEET

PLAN	JUSTIFICATION Identify factors Used to Justify Your Plan

Worksheet 1.3-a(2)

NAME _____

NEW GOALS FOR NEXT SCHOOL YEAR

Alternate Learning Activity 1.3-b

Not only does the Vocational Education Curriculum Specialist need to be able to develop goals from needs statements, this person also needs to be able to assist groups of lay citizens or professionals in the selection or prioritization of goal statements.

One means of establishing goals on a priority basis is known as "magnitude estimation scaling"[5] and is very useful in small local school districts.

Magnitude estimation scaling is a technique used to establish order and relative importance of items contained in an opinion survey. The Vocational Education Curriculum Specialist should be aware of this method of establishing goal priorities.

1. Write or select 10 or more items (statements) to be contained in the survey. For example, goal statements may be:

   Provide each high school graduate with an employable skill, or

   Improve consumer competencies of all employees in the community.

2. At random, select one item to be the relevant item and assign a value such as 50. Survey participants will be asked to assign values to all other items based on their relative importance when compared to the referent item.

---

[5] Rasp, Alfred, Jr. Establishing District Priorities Using Magnitude Estimation Scaling. Paper presented to Third Annual Pacific Northwest Educational Research and Evaluation Conference, Washington Education Research Association, Seattle, WA, May, 1975.

3. Print items (one each) on a packet of survey cards using a different color card for the referent item. (Fifty statements would require 49 white item cards and one referent item card of another color.)
4. Print an additional (different colored) direction card which describes the cards and explains that the task is to assign a value to each item based on its relative importance to the referent item. (If referent item is 50 an item twice as important would be scored 100.)
5. Arrange the packet of survey cards so the direction card (color) is on top, the referent item card (a different color) is next, and the additional item cards (white) follow in any order. Put all cards in an envelope or hold with a rubber band.
6. Distribute and collect packets of survey cards to all of (or a sample of) the population (students, parents, school board, teachers, etc.) to be surveyed.
7. Find the mean value of each survey item by calculating the geometric mean for each. Request computer assistance from the Superintendent of Public Instruction's Program Evaluation Office or follow the example below for computing a geometric mean.
8. Analyze the data collected (total population surveyed or by groups) and display it in appropriate charts and graphs.
9. Report outcomes.

EXAMPLE: The geometric mean of $\underline{N}$ numbers is the N^{th} root of their products.

Find the geometric mean of 2, 7, 15, 91, 103, 111 or solve (2, 77, 15, 91, 103, 111) 1/6.

Convert to logs with mantissa table.

Log 2	=	.3010
Log 7	=	.8451
Log 15	=	1.1761
Log 91	=	1.9590
Log 103	=	2.0128
Log 111	=	2.0453
Log of Product	=	8.3393
1/6 Log of Product	=	1.3898

Geometric mean = Analog 1.3898 = 24.54

Alternate Learning Activity 1.3-c

Another method used in helping lay citizens and professionals establish goals using a priority system is the Phi Delta Kappa education goals and objectives kit.

The kit can be obtained from the Commission on Educational Planning - Phi Delta Kappa, Inc., P.O. Box 789, Bloomington, Indiana, 47401.

Obviously other goals besides the 18 goals in the kit could be used. After obtaining a kit, find a group of people who are willing to go through this activity with you.

PERFORMANCE OBJECTIVE 2 ●●

Write and sequence performance objectives in behavioral terms.

Explanation

Although the actual product of this objective is developing the ability to produce a written performance objective, the essence of the objective is competency in the systematic development of instructional objectives. This will necessitate an analysis of goals and the development of performance objectives based on their analysis.

Three instructional objectives need to be accomplished to assure competency in writing goal-related instructional objectives.

Instructional Objective 2.1

Develop a technique for writing performance objectives in behavioral terms. As an initial step in achieving this objective it is suggested that students refer to the references listed below and study the following material on "Elements of Behavioral Objectives."

References:

Mager, Robert. Developing Instructional Objectives. Belmont, CA: Fearon Publishers, 1967.

McAshan, H. H. Goals Approach to Performance Objectives. New York: Harper and Row, 1970.

Popham, W. James, and Baker, Eva. Establishing Instructional Goals. Englewood Cliffs, NJ: Prentice Hall, 1970.

ELEMENTS OF BEHAVIORAL OBJECTIVES

From the preceding list of recommended readings you have learned that a behavioral objective must contain:

1. observable behavior on the part of the learner,
2. conditions under which the learner behavior is to occur, and
3. minimumly acceptable performance on the part of the learner.

Only when all three elements are stated is an objective written appropriately.

Element One

The first element of a behavioral objective is that it must contain a word, generally a verb, that indicates how the learner is to perform. What is the learner doing or what is the learner producing?

Example: Write the names of control knobs found on the face of an oscilloscope. (In this example the verb "write" offers an observable behavior that the learner is performing.)

Element Two

The second element for behavioral objectives is that it must state the conditions under which the learner is to perform the behavior. Under what circumstances or conditions must the learner perform or, when is the behavior to occur?

Example: From a given description of symptoms, the student will identify symptoms that describe the physiological effects of alcohol on the human body. (The phrase "from a given description of symptoms" describes the circumstances or conditions under which learner behavior is to occur. Usually the condition will specify what materials will be used to accomplish some task.)

Element Three

The third element for a behavioral objective must be defined in an acceptable standard of performance. This definition must always be in terms of the minimum acceptable performance.

Frequently the minimum performance is not expressed, it is assumed to be 100%. Also, the learner is often asked to perform according to a specific time limit such as typing 150 words in 3 minutes.

Example: When given a carburetor that is misadjusted but contains no malfunctions, the student will be able to readjust it for a maximum performance by oscilloscope patterns according to tune-up manual within a 5 minute period. (In this example, the phrase "maximum performance by oscilloscope patterns according to tune-up manual within a 5 minute period" describes the minimum acceptable performance.)

Learning Activity 2.1-a

Note to Instructor: The following worksheet may be completed individually and then discussed in a group session or may be completed in small groups. Students should be given the opportunity to challenge each other and determine difference in analysis.

Worksheet

In the following performance objectives, identify any of the three elements which are included:

1. Given a Wollensak tape recorder, the student will thread the tape and adjust the machine so that the sound is reproduced correctly.

   Observable Behavior_____

   _____

   Conditions_____

   _____

   Standards of Performance_____

   _____

2. The student will list foods in the four basic food groups.

   Observable Behavior_____

   _____

   Conditions_____

   _____

   Standards of Performance_____

   _____

3. The student will be able to identify by name 8 out of 10 tools used in mechanical drawing when the instructor holds each item in front of the class.

   Observable Behavior_____

   _____

   Conditions_____

   _____

   Standards of Performance_____

   _____

4. Given a schematic diagram, the student will trace the flow of AC current from the microphone through the amplifier to the speaker within a 3 minute period.

   Observable Behavior_____

   _____

   Conditions_____

   _____

   Standards of Performance_____

   _____

5. Using the specification guide and a table saw, the student will adjust the table saw to correct alignment of the table, blade and fence, according to guide specifications, 9 out of 10 times.

   Observable Behavior_____

   _____

   Conditions_____

   _____

   Standards of Performance_____

   _____

Learning Activity 2.1-b

- Using section 1 of Activity Sheet 2.1-b, develop a definition of a performance objective. Clearly underline the dominant elements of your definition. Check your definition with Mager's and McAshan's. How is it different? With whose definition does it show the greatest agreement? Why?
- On section 2 and 3 of Activity Sheet 2.1-b, list the advantages and disadvantages of writing instructional objectives in performance terms. Once you have completed each list, write an explanation or rationale for placing each item in the particular section.
- Write two sample performance objectives in section 4 of Activity Sheet 2.1-b. Underline and identify each element of a performance objective.
- Bring Activity Sheet 2.1-b to a class or seminar meeting. Be able to defend your definition and explanation of the advantages and disadvantages of performance objectives.

Activity Sheet 2.1-b

1. Basic Definition of Performance Objective -

2. Advantages -

Explanation:

3. Disadvantages -

Explanation:

4. Objective I -

Objective II -

Alternate Learning Activity 2.1-c

Persons who have interest or need to further examine the characteristics of performance objectives--observable behavior, conditions and standards (or criteria)--will find the following exercise helpful. The reference to be used is:

Byers, Edward E., and Huffman, Harry H. eds. Writing Performance Goals: Strategies and Prototypes. New York: Gregg Division/McGraw Hill Book Co., 1970

WRITING PERFORMANCE GOALS: STRATEGY AND PROTOTYPES

1. Before you do anything else read the preface -- only the preface. There is no new information here but it reviews your previous knowledge and directs your attention to "Performance Goals."

2. Review in your mind what is meant by a behavioral objective. (In this manual the two terms, performance goals and behavioral objectives are used synonomously.)

3. Now, turn to Page 1, Part one, and read the first 5 pages. Read just to, "A System for Writing Performance Goals." Read no further.

   a. Check the characteristics, i.e., qualities and components, of a performance goal. Do the ones given compare with your previous idea?

   b. Note definition of terms.

4. Skip some pages! Turn to page 42. Examine these two plates ignoring the far left column. Notice that under CONDITIONS the first category is the type of dog: then there are categories of condition of coat, state of health, etc. In each category there are a number of choices. In the second column, categories given are method, expected output, quality of output, amount of time to be used and previous experience. Page 43 lists the task in sequence and the criteria for each step.

   Now turn to the column to the far left. Note this is a combination of phrases from the categories. You may want to try writing another performance goal using other phrases. Use all of the categories.

5. Now that you have an idea of how this detailed process is done, go back to page 5 and read the explanation of the process. Read from page 5 to page 31, <u>but</u> if you get bogged down or none of it seems to make sense, stop and proceed as directed below. However, if you stop before finishing, return to this part when you are through and read again.

6. Turn now to the introduction given to each occupational area. At this time read <u>only</u> the introductions. Pages 33, 45, 59, 70, 82, and 95. Yes, you will find some repetition. It is suggested you try to identify any unique comments, differences or distinctions in the introductory remarks. (The writers have different orientations to vocational education and will reflect some differences in philosophy.)

7. Turn to the Index, page xi, and pick out a task in an area in which you feel fairly knowledgeable, e.g., trade and industrial, power sawing in carpentry. Turn to the page that gives the CONDITIONS, DIRECTIONS AND CRITERIA. Study the categories of the conditions, and the directions and critieria as you did for PREPARING AND CLIPPING A DOG.

8. After you have become thoroughly familiar with the material given for the task you selected, write a new performance goal using the PROTOTYPE method but a different sequence of numbers than used in the sample.

Does it seem silly and tedious? You will have to admit that it made you consider all aspects of the task that is to be taught!

9. If you would benefit from additional practice, turn to another task, perhaps one in a different occupational field. If you didn't select an eliciting task before, try one of these.

10. Having completed the above steps it is suggested that you go back to finish, or reread pages 5-31.

11. Now that you have written a performance goal from the material appearing in the manual, it is suggested that you develop material for a different task--one that does not appear in the manual. Remember, you are to provide all of the "givens"--the methods, output, the time in which the task is completed--if that is appropriate. For the particular occupations you choose you may find you need other categories of conditions. Next you will sequence the task and write criteria for each step.

Instructional Objective 2.2

Write performance objectives derived from a goal analysis.

Now you are expected to possess the skill for writing performance objectives. You need to be able to write objectives related to goals. This is called goal analysis.

Learning Activity 2.2-a

Use Activity Sheet 2.2-a as a working form. The objective is to develop performance objectives from goal statements.

Step I - Select three goals to be placed in column 1. After you have done this, glance through the following references, or a reference of your choice. (You have used these sources in previous objectives and probably have a choice.) Select one approach for use.

Step II - On a piece of paper, outline the steps of the selected process. If you are not certain of the steps, check with your instructor. Using these steps, use column two for purpose of analysis. It helps to list the steps in this column and then relate the elements of the goal to each step.

Step III - Based on analysis of Step II, write several goal related performance objectives. Remember the elements of a performance objective as defined in Activity 1.

References:

Mager, Robert, and Beach, Kenneth M., Jr. Developing Vocational Instruction. Belmont, CA: Fearon Publishers, 1967.

McAshan, H. H. The Goal Approach to Performance Objectives. New York: Harper and Row, 1970.

Activity Sheet 2.2-a

GOAL	ELEMENTS	OBJECTIVE

Instructional Objective 2.3

Write performance objectives at all levels of the cognitive domain of the taxonomy of educational objectives.

Explanation:

As was the case in writing goals for various levels, objectives are also written for various domain levels. The most widely used taxonomy identifying three domains is the work done by a Committee of College and University Examiners in the 1950's. The following two references give details of the cognitive and affective domains.

Bloom, Benjamin. (ed.) Taxonomy of Educational Objectives. Handbook I: Cognitive Domain. New York: David McKay Co., Inc., 1956.

Krathwohl, David R.; Bloom, Benjamin S.; and Masia, Bertran B. Taxonomy of Educational Objectives. Handbook II: Affective Domain. New York: David McKay Co., Inc., 1964.

Although several educators have tackled a similar development of the psychomotor domain, there is no widely accepted taxonomy. A perceptual domain has been suggested as a fourth domain and several educators have suggested simplified taxonomies of the cognitive domain. A summary of selected taxonomies appears in the following reference:

Bloom, Benjamin S.; Hastings, J. Thomas; and Madans, George F. Handbook on Formative and Summative Evaluation of Student Learning. New York: McGraw Hill, 1971. pp. 864-865.

Bloom's Taxonomy, Cognitive Domain, provides a system as analysis for determining the level of a written objective. This objective (Instructional Objective 2.3) has been established to provide the Vocational Education Curriculum Specialist with these analytic competencies.

Learning Activity 2.3-a

A self-instructional module based on the cognitive domain appears in the appendix. Completing this module should give you an understanding of the taxonomy and the skill for writing objectives at each level. Complete the module at

your pace. If you already know how to write objectives at each level, you may want to skim the module.

Learning Activity 2.3-b

Use the following Activity Sheet to practice writing objectives at different levels.

Select a vocational education goal and write it in column 1. Write at least one performance objective for each level. Bring your objectives to the seminar session for class presentation. Be sure your objectives are (1) related to the goal, (2) written in performance terms, and (3) written at the appropriate level of the taxonomy.

Activity Sheet 2.3-b

GOAL	OBJECTIVES - COGNITIVE DOMAIN
	KNOWLEDGE:
	COMPREHENSION:
	APPLICATION:
	ANALYSIS:
	SYNTHESIS:
	EVALUATION:

Instructional Objective 2.4

Develop a program of objectives for instructional purposes.

Explanation:

For objectives to have a purpose, they must be instructionally functional. Each Vocational Education Curriculum Specialist should now have the ability to write objectives clearly and concisely. The next item is that of ordering or sequencing objectives so that instructional activity or strategy planning can occur.

Learning Activity 2.4-a

Step I - Read Planning an Instructional Sequence by W. James Popham and Eva Baker. Special attention should be given to Chapter 4.

Step II - From the above reading, make a list of procedures necessary for sequencing. Be prepared to defend your check-list.

Step III - Select a vocational education goal and write it in column 1 of Activity Sheet 2.4-a. Then, using the procedures developed in Step 1, write and sequence objectives for the particular goal. You should label the cognitive level of each objective in the cognitive domain and label the objective psychomotor or affective, if it is not in the cognitive domain. Be prepared to defend your sequencing.

Learning Activity 2.4-b

Visit a school in your area that offers vocational instruction. Interview an instructor, outside of your area of expertise, and discuss the goals and objectives of the course. Obtain a list of goals and objectives and sequence them.

Activity Sheet 2.4-b

GOAL	OBJECTIVE	COGNITIVE LEVEL OR DOMAIN

Instructional Objective 2.5

Distinguish a learning activity from a performance objective.

Explanation:

In order to develop curriculum and offer assistance to instructors, the Vocational Education Curriculum Specialist must be able to distinguish a learning activity from performance or behavioral objectives. A common mistake in curriculum design can be overcome with relative ease.

Although often confused, there is a difference between an objective and a learning activity. While an objective describes the terminal behaviors which must be learned and demonstrated by the student, the learning activity is a sequence of experiences for the learners so that they may be able to achieve a performance objective.

The performance objective contains (a) observable behavior, (b) conditions, and (c) standards of performance. The learning activity is dependent upon (a) teaching methods, (individualized and other instructional strategies), (b) instructional materials, and (c) instructional media.

In planning an educational program to attain a given objective, the teacher must decide on the particular learning activity to be provided, since it is through this experience that learning takes place to meet the given objective. The teacher must then organize the selected methods and materials into lesson plans for implementation.

Learning Activity 2.5-a

Label the following examples as either a performance objective (PO)* or a learning activity (LA).

____1. To list the symptoms of incorrectly gapped spark plugs in a combustible engine.

---

* For purposes of this exercise, incomplete (shortened form) behavioral objectives are being used.

____2. To type a minimum of 50 words per minute.

____3. To visit a sawmill.

____4. To clip out newspaper and magazine articles related to occupational items.

____5. To match the appropriate color and number used in the RMA resistor color code.

____6. To view a film on the operation and care of a metal lathe.

____7. To select appropriate first aid measures for a patient found to be in a non-breathing condition.

____8. To read the book by Ralph Tyler, Basic Principles of Curriculum and Instruction.

____9. To sharpen a drill bit.

___10. To interview a minimum of five workers in a specific occupation.

Check your responses with an instructor or other students.

State in your own words the difference between a learning activity and an objective: _____

_____

_____

_____

_____

PERFORMANCE OBJECTIVE 3 ●●●

Demonstrate the ability to complete an occupational analysis and an instructional analysis as part of the instructional plan.

A vocational curriculum specialist must be able to look at business and industry and by the use of predicted manpower data, advisory boards, etc., select occupations for vocational training. Therefore, knowledge of how to complete an occupational analysis and an instructional analysis are vital in accomplishing this goal of completing an instructional plan. Performance Objective 3 may be achieved by completing three Instructional Objectives.

Instructional Objective 3.1

Demonstrate the ability to complete an occupational analysis.

To insure that instruction is appropriate for an occupation there must be an inventory of the elements to be taught. An occupational analysis can provide the essential elements of an occupation.

There are many techniques for making an occupational analysis. The techniques described in the Learning Activities are adequate for developing the skills involved.

Learning Activity 3.1-a

On the following pages are three worksheets which are to be reviewed by the student in preparation for the reading assignment given below. These may be reviewed individually or in a group session. Each student will:

a. Read:

Fryklund, Verne. Occupational Analysis. New York: Bruce Publishing Co., 1970.

b. Complete worksheets 1, 2, and 3.

Occupational Analysis

Worksheet 1
Learning Activity 3.1-a

Define the following terms on the basis of reading[6] and/or class lectures.

1. Occupational analysis

2. Systems analysis

3. Job classification

4. Jobs

5. Operation or Step

6. Job description

7. Blocks

---

[6] Fryklund, Verne. Occupational Analysis. New York: Bruce Publishing Company, 1970. Chapters 1, 4-7, 10 and 11.

Occupational Analysis

Key [7] - Worksheet 1
Learning Activity 3.1-a

1. Occupational Analysis, a technique by means of which the essential elements of an occupation, or any part of an occupation or activity, are identified and listed for instructional purposes.

2. Systems Analysis, a research technique in business and industry conceived for the solution of problems relating to identifying and overcoming difficulties in effective utilization of resources in management, production, and distribution of goods.

3. Job Classification, a technique used in establishing base rates for classifying all jobs. It consists of two kinds: classification (1) by occupations and (2) by grades within an occupation or in several occupations.

4. Job, the work done for remuneration.

5. Operation/Step, a unit of work in a job that involves the making, servicing, or repairing of something.

6. Job Description, statements relating to general duties, training required, working conditions, remuneration, and so on, of any person who would attempt to qualify as a worker in a particular occupation.

7. Blocks, an occupation made up of divisions of work each of which is practically an occupation in itself. A person can be trained in a division or in the whole occupation. It is very applicable to service and industrial trades.

---

[7] Fryklund, Verne. Occupational Analysis. New York: Bruce Publishing Company, 1970.

Occupational Analysis

Worksheet 2
Learning Activity 3.1-a

A. List the eight important points in identifying operations, given by Fryklund.

1.

2.

3.

4.

5.

6.

7.

8.

B. What are the three kinds of information topics necessary for doing an occupational analysis?

1.

2.

3.

Occupational Analysis

Worksheet 3
Learning Activity 3.1-a

Blocking an Occupation

A. Choose one occupation and complete a block description of it.

B. Choose one block of the above exercise and show the operations procedure for that block. Include related information.

C. Select one operation and list the instructional steps necessary and in proper sequence to complete the operation. List the tools, equipment, and material needed to teach the operation.

Learning Activity 3.1-b

Another method of occupational analysis is the one presented in Mager and Beach. The following worksheets are to be reviewed by the student in preparation for the suggested reading assignment. These may be reviewed individually or in a group session.

Each student will:

a. Read:

Mager, Robert, and Beach, Kenneth M., Jr. Developing Vocational Instruction. Belmont, CA: Fearon Publishers, 1967. Chapter 3.

b. Complete the task analysis worksheets.

Task Analysis

Worksheet 1
Learning Activity 3.1-b

On the basis of reading Chapter 3 of Developing Vocational Instruction by Robert Mager and Kenneth Beach and/or class lectures, define the following terms:

1. Job:

2. Job description:

3. Task:

4. Task listing:

5. Task detailing:

Task Analysis

Key - Worksheet 1
Learning Activity 3.1-b

1. Job, includes a number of tasks performed by a worker in a vocation.

2. Job description, is a general statement about what tasks a person on the job does, and tells something about the conditions under which he/she does them.

3. Task, a logically related set of actions required for the completion of a job objective.

4. Task listing, the first step in the task analysis which involves the listing of all the tasks that might be included in the job.

5. Task detailing, the second step in the task analysis which involves listing the steps involved in each of the tasks on the list in terms of what the person does when performing the step.

Task Analysis

Worksheet 2
Learning Activity 3.1-b

A. Draw the configuration of the Task Listing Sheet given by Mager and Beach and explain the purpose of each column.

B. From your area of expertise and/or an assigned occupation from your instructor, complete one "Task Listing" for one occupation.

Task Analysis

Worksheet 3
Learning Activity 3.1-b

A. Draw the configuration of the Task Detailing Sheet given by Mager and Beach and explain the purpose of each column.

B. From your area of expertise and/or an assigned occupation from your instructor, complete one "Task Detailing Sheet" for one occupation.

Instructional Objective 3.2

Design a course outline from an occupational analysis, advisory group input, curriculum guides, and other related sources.

Background Information

The Course Outline determines the objectives and learning activities which are to be incorporated into the instructional plan. When the selection of these items is complete and the teaching methods have been decided upon, then specific lesson guides can be prepared and needed content selected. The process of deciding upon what should be included in the content of a course is called "Subject Matter Analysis." Systematic analysis will provide the teacher with a structural framework for writing the course outline.

To begin, the teacher needs to decide upon the overall goals for the course. These general goals are usually developed after careful consideration of the various subject matter elements and their relationship to what the student is to do with the knowledge or skill after it is mastered. Concurrently or following the goal writing process, skills and knowledge required are analyzed to determine the subject matter or content. Some common methods used to analyze subject matter are: (1) analysis by the teacher based upon past experiences, (2) consultative assistance, (3) advisory committee suggestions, or (4) a combination of these methods. Whatever the analysis method utilized, the process involves the identification of major topics of the subject matter needed to develop competencies required in the occupation. A course can then be organized into units.

Each unit is based on the same, or related, course goals (or occupational competencies) and takes into consideration logical relationship of equipment required, skills and knowledges required, and materials or products used.

Units are divided into smaller segments which are usually referred to as lessons, and which may vary in length from a few minutes to a number of hours depending upon the objectives to be achieved. As the course outline is developed, some of the factors to be considered are: (1) the background and capabilities of the potential student, (2) the available instructional facilities and equipment, and (3) the expected benefit from the instruction.

It may become evident early in the process of outline development that many units and/or segments cannot be included in the initial instructional plan. Time considerations, equipment requirements, teacher expertise and other factors which are unique to an instructional situation require that these be planned on-the-spot.

The sequence of the various units and their segments is critical. The sequence of presenting teaching material to students should always be from relatively simple or "easy" to the complex or difficult material. Instructional levels refer to the level of proficiency expected of the student after each unit of instruction is presented.

The following criteria should provide some further guidance for determining the instructional plan.

1. The design of the course should facilitate and encourage the selection and development of many types of learning experiences which contribute to the achievement of the desired outcomes.
2. From among all the learning experiences that might contribute significantly to the realization of educational goals and objectives, the course design should enable the teacher to develop those that are most meaningful to a particular group of learners.

3. The design should permit teachers to utilize sound principles of learning in selecting and guiding the development of learning activities in the class.
4. The design should enable teachers to adapt the experiences to the developmental needs, capacities, and maturity levels of students.
5. The design should encourage teachers to take account of the learning experiences which students have outside the class and relate those to activities carried on within it.
6. The design should provide a continuity in learning experiences so that the learning activities in which students are engaged at any one time build on and fully develop learnings gained from earlier experiences and lead into further experiences.
7. The design of the course should be realistic, feasible, and acceptable.

The steps to use in organizing the unit outline are:

I. Selecting the unit title/developing the topical outline

A. Unit

(1) A unit is an entity that is identified by its homogeneous content and not by conditions of time. It is that part of the instruction that focuses upon a central content oriented topic, such as the "respiratory system" or the "automobile braking system," or a basic competency such as "calculating fertilizer needs," "handling complaints," or "writing specifications."

B. Writing the unit title

(1) Write unit titles that are concise, complete, and descriptive of the unit content.

(2) Avoid titles that are too brief and consequently open to conjecture, such as "pole timber," "transistors," "laws,"

"monitoring."

II. Identifying lessons within a unit

A. Lessons are instructional divisions of a unit. Each lesson is a segment of cohesive instructional activity and the total instructional segments within a unit of instruction provide for sequential and coordinated learning experiences.

B. Factors that determine the number of instructional segments in a unit are:

(1) the complexity and number of performance objectives for the unit,

(2) the level of proficiency required in the occupation for which learners are being prepared,

(3) age, academic level, ability and background of learners,

(4) equipment, tools, and materials available, and

(5) sequence of the unit within the course.

Learning Activity 3.2-a

Using suggestions given above and the occupational analysis completed in Learning Activity 3.1-a or 3.1-b, develop a course outline for an occupation. A suggested format is given on the following page.

Suggested Course Outline Format

For the purposes of standardization and general guidance, the following format is suggested:

(1) Title Page

(11 single spaces from top of page and centered)

Course title (use all capital letters)

(6 single spaces)

Institutional information (school, college, etc.)

(7 single spaces)

Date

(7 single spaces)

Prepared by:

Your name

Course title

Course description

(This is a very brief overview of the course stating the general purpose of the course, an indication of the length of the course (hours of instruction) and the appropriate background or preparation of potential students.

Course goals

1. _____

2. _____

3. _____

Course outline

I. Unit title — Performance Objectives for Unit

A. segment or lesson title

B. _____

C. _____

II. Unit title

A. segment or lesson title

B. _____

C. _____

Instructional Objective 3.3

Design complete detailed plan to be used for instruction.

Background Information

While there is no one best way to develop and present a detailed instructional plan, that is, a lesson plan, all plans need to consider: (1) the behavior or performance required by the occupation, (2) the motivation, intellectual ability, social and cultural backgrounds and academic ability of the students, and (3) the method or approaches which most effectively and efficiently can assist the learner in achieving the required level of performance.

The following format has been selected because it helps the instructor meet the above requirements for nearly all instructional activities. An explanation of the various components of the lesson plan format follows and a sample lesson plan is included.

Section 1 - Unit

In a sentence or two explain the unit of which this lesson would be a part and where, in the context of the larger unit, it would be taught.

Section 2 - Behavioral objectives

State your behavioral objectives in writing. Remember, your objectives must follow the pattern suggested by this module and must be clear to your students.

Section 3 - Rationale

The rationale is a simple explanation or justification of why the learner needs to achieve the behavioral objectives. Imagine a visitor asking, "Why are you teaching this at this time?" The rationale would be your response.

Section 4 - Content

Content includes facts, principles, or generalizations which are needed to achieve the behavioral objective. The extent to which they are included in the lesson plan will depend upon the experience and background of the teacher. At a minimum, this should be a "key word" checklist of the material to be taught, arranged in the order that you will teach it. This kind of checklist can save you and your students a great deal of misunderstanding and confusion if it is prepared and used carefully.

Section 5 - Instructional strategies

The instructional strategies are methods used to involve the learner in activities which will lead to the achievement of behavioral objectives. Although these may be considered teaching or teacher strategies and are teacher guided, learning will result only from activity of the learner. The strategies selected need to provide an opportunity for the learner to practice the behavior stated in the behavioral objective.

Section 6 - Evaluation Procedures

This part of your lesson plan should describe in detail the procedures you will follow in evaluating progress of the student and student performance at the conclusion of instruction. These procedures must relate to the conditions and criteria stipulated in the behavioral objective at the beginning of the lesson. A word of caution: BE SURE YOU MEASURE THE BEHAVIOR AS STATED IN THE OBJECTIVE AND UNDERSTOOD BY LEARNER.

Section 7 - Materials and aids

This should be a checklist of everything you plan to use in the lesson. The list should include audiovisual equipment, handouts, books, equipment and lab materials.

Learning Activity 3.3-a

At this point you should now be able to combine all of the competencies learned in the module toward the preparation of a lesson plan based on behavioral objectives and content required in an occupation in your vocational field.

Prepare a single lesson plan following the format discussed and illustrated using an instructional objective appropriate to an occupation in your vocational field. This plan may be one to incorporate into your Carrier Project.

Bring the lesson plan in to the appropriate instructional team member for evaluation.

Sample Lesson Plan

UNIT

This lesson is to be included in an overall unit dealing with resistors as electronic components. It should be introduced prior to any circuit building.

BEHAVIORAL OBJECTIVE(S)

Given 10 resistors marked with RMA color code bands, the student will be able to give the correct ohmage value and tolerance of each resistor with 100% accuracy.

RATIONALE

To be effective in the electronic industry students must be able to identify resistor values using the standard color code markings accepted by industry.

CENTRAL IDEA

The identification of resistors by color codes

Instructional Objective	Procedures (Strategies)
1. Assign numerical values to appropriate colors	a. ask if any students know the systems b. ask students to give values and list on blackboard c. give "jingle" to help remember colors and code d. demonstrate on overhead projector how the colors work together e. ask students to assign values to examples
2. Assign tolerances	a. explain purpose of 4th band b. explain values of gold and silver c. give examples on overhead projector d. ask students to assign tolerance to new examples on overhead

EVALUATION PROCEDURE

After students appear to be able to assign the proper ohmage value and tolerance, show 20 resistors of various values and tolerances to the students. Have them list the proper values and tolerances. Exchange papers and score the correct answers. Return papers to students for immediate feedback and hold up for examination any resistor missed by a student and have another student explain the value and tolerance. Provide additional instruction to those who did not get 100%.

MATERIALS AND AIDS

Overhead projector, marking pen, transparencies--blank and examples, chalkboard, chalk, and 20 resistors.

APPENDIX

APPROACHES TO THE WRITING OF PERFORMANCE OBJECTIVES IN THE SIX LEVELS OF THE COGNITIVE DOMAIN

A Self-Instructional Module

Vocational teachers, as well as curriculum specialists, will be involved in the management of learning. It is the intent of this module to provide you with information about the cognitive taxonomy.[1]

Knowledge of the cognitive taxonomy assists one in writing of performance objectives which are meaningful. However, it should be remembered that knowledge of the taxonomy is of little value if this knowledge cannot be applied to some communication process between teacher and student.

Objectives of This Module

1. Recognize six levels in the cognitive domain and when given a list of performance objectives at various taxonomic levels, identify and label each objective at the appropriate level.
2. Demonstrate an understanding of the rationale for writing performance objectives.
3. Recognize the component parts of a performance (behavioral) objective and complete a minimum of three performance objectives including all the components, which will be applicable to at least three different occupations.
4. Write a performance objective for a designated taxonomic level.
5. Identify the behavioral objective classification and apply this classification to a specific taxonomic level.

Introduction

Since persons are not born with knowledge, they must in some way acquire

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[1] Benj n Bloom, ed., Taxonomy of Educational Objectives. Handbook I: Cognitive i ain, (New York: David McKay Co., Inc., 1956).

it. When knowledge is acquired, it can be used as a basis for developing skills and abilities which are usually referred to as levels of understanding. In the taxonomy presented by Taxonomy of Educational Objectives, this theme is utilized. Robert Gagné[2] refers to knowledge as information and to skills and abilities as capabilities and cognitive strategies. Both references indicate a need for classification, as well as structure, to enable teachers and students alike to better understand the learning process.

Although a taxonomy is a classification system, a means of categorizing objects into sets, it has another element that makes it unique. It is hierarchical in structure. The type of taxonomy dictates the method by which classes are arranged in the hierarchy.

Types of learning have been divided into three categories by educators. These categories are often referred to as domains, since they deal with different aspects of the mind. The psychomotor domain primarily deals with the ability to coordinate the physical being. Examples of the psychomotor domain would be the ability to hammer a nail, position stock in a vise, or form a loaf of bread. Many objectives, such as "throw a ball" or "form a letter of the alphabet," are written in the psychomotor domain for primary grades; and many in secondary grades are utilized in the area of physical and vocational education. The affective domain deals primarily with values, attitudes, interests, and feelings. These objectives are included in vocational education because of their importance in getting and keeping a job. However, these objectives are more difficult to evaluate, since the measure of attitudinal change often is clouded by the difference between stated attitudes and real attitudes. In this module we will be primarily concerned with the cognitive domain.

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[2] Robert M. Gagné, Conditions of Learning, (New York: Holt, Rinehart and Winston, Inc., 1965).

It must always be remembered, however, that in the development of cognitive objectives (primarily the development of what to teach), there is always the underlying affective area that often dictates how we teach.

COGNITIVE DOMAIN

The cognitive domain taxonomy is divided into two parts. The first part deals with knowledge, memory, and recall. The second part is concerned with complex behaviors, abilities, or skills. In the cognitive taxonomy, it is presupposed that there are several types and levels of thinking. Because of this, people who concern themselves with the writing of objectives in the cognitive domain must plan learning techniques and strategies upon these various levels of thinking for the proper focus to be implemented. The levels of the cognitive domain, according to Bloom, are:

Knowledge

Comprehension

Application

Analysis

Synthesis

Evaluation

In terms of sequential arrangement of the cognitive hierarchy, knowledge would be considered the lowest level (least difficult to grasp) and the other five categories would increase in difficulty from comprehension to evaluation. For the purpose of understanding the taxonomy, we might then go to a numbering system: 1) knowledge, 2) comprehension, 3) application, 4) analysis, 5) synthesis, and 6) evaluation.

KNOWLEDGE:

Knowledge is the category in the cognitive domain that emphasizes the ability to remember information or facts. The achievement of knowledge is assumed when the student is merely regurgitating information that has been previously disseminated. There has been much research done in the area of this level of the taxonomy and the research indicates that the knowledge level is overused to the extent that it is detrimental to the thinking process. Although the knowledge level forms a basis from which to build complex behavior, the learner is not actively involved in utilizing or transforming information. There are some educators who go so far as to say that knowledge may be useless unless it is utilized in some way. There are also those who purport that knowing without using knowledge in a demonstrated or literal sense could have a negative effect in the affective area, especially in the area of the development of interests and positive self-concept.

In constructing performance objectives for the knowledge level the verbs utilized would be to define, recall, list, write, acquire, name, identify, recognize, memorize, outline, distinguish, relate, or tabulate. This is not a complete list, but one on which you can rely as you begin to develop objectives of your own at the knowledge level.

The outcomes approach to the writing of performance objectives at the knowledge level consists of the inclusion of three major components. The three components recommended by Robert Mager in Preparing Instructional Objectives[3] are: 1) observable behavior, 2) conditions, 3) criterion. Observable behavior on the part of the learner would be the verb phrase of the objective. Verbs to be avoided in the description of observable behavior would be to understand, appreciate, know, or comprehend. These verbs describe behavior which is difficult

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[3] Robert F. Mager, Preparing Instructional Objectives, (Palo Alto, CA: Fearon Publishers, 1962).

to measure unless assumptions on the part of the evaluator are included.

Conditions under which the student will be expected to demonstrate achievement of the objective must be described in written objectives. Special instruction, materials, equipment, or time limits would constitute conditions.

Criterion for success must be included in the objective. The percentage correct, the number right, the range of acceptability or the minimum level of accuracy are examples of criteria for success.

The outcomes approach to writing performance objectives emphasizes that the function of these performance objectives is for the planning of instruction. In writing performance objectives for the planning of instruction it is assumed that each student within the classroom can successfully master the behavior which is specified in the objective. The criterion level of the objective, then, should specify the minimum acceptable performance.

COMPREHENSION:

Objectives written at the comprehension level require the learner to paraphrase, restate, or translate ideas from one form to another. Verbs commonly used in the writing of objectives at the comprehension level would include to group, form, translate, read, examine, discuss, classify, interpret, describe, illustrate, prepare, estimate, summarize, restate, rephrase, reorder, draw, demonstrate, infer, predict, extrapolate, and extend. This is not a complete list, but one on which you can draw as you begin to write objectives at the comprehension level.

The basis behind the comprehension category of the cognitive taxonomy is one of understanding the information acquired. This is considered to be one level higher than the knowledge category, since at this point, students must digest the material or information and be able to restate in their own words and within their own framework.

A comprehension question requires a greater degree of active participation by the student. The student in responding to a comprehension question must manipulate the information in such a way as to make it more than just recall or regurgitation. Material or information which the student has rephrased in his/her own mind will be retained longer.

Examples of performance objectives written at the comprehension level would be:

1. Given 25 resistors, the student will write the proper ohmage value from the color code markings with a 100% accuracy.

2. Given 25 pieces of wood, the student will place the woods into the two categories of wood classification, hard or soft, with 90% accuracy.

In developing your own objectives, you should always be aware of the rationale behind your selection of an objective. If there is no reason for the student to be introduced to certain information, or no reason for a component of a lesson to be included in your instruction, why include it? It should be observed also that objectives written at the comprehension level of the cognitive taxonomy are concerned with the restating of ideas or interpretation of information.

If you would like to check on your progress at this point in the module, there is a test on the next page for your consideration. If you cannot complete this test, it might be well to reread the knowledge and comprehension sections of this module.

INSTRUCTIONS: Place a K before each Knowledge question or test item.

Place a C before each Comprehension question or test item.

1. ____ How would you define radio transmission?

2. ____ Without the use of a text, list the different types of weld joints.

3. ____ What does fusion mean?

4. ____ Using the definition of fusion stated above, formulate in your own words, a definition for atomic fusion.

5. ____ Given a description of complete treatments for a hospitalized patient with tasks underlined, write above each underlined task the person (Medical Doctor, Registered Nurse, Aide) who should assume each task.

6. ____ Summarize the events leading up to the industrial accident.

7. ____ List in order the six levels of Bloom's Taxonomy.

8. ____ Give an example of de facto segregation.

KEY - TEST ON COMPREHENSION

1. __C__ The clue here is the underlined word "you." The learner has had to rephrase.

2. __K__ Probably recall. However, if the types of welds had been covered in class at some earlier time and the students were asked to identify examples of welds, then this question would be at the Comprehension level.

3. __K__ A student could parrot back a textbook definition and answer the question.

4. __C__ Here the student must explain the term in his/her own words.

5. __C__ This exercise required students to identify examples of tasks to be performed by Aides.

6. __C__ The student is asked to take all the events leading up to the industrial accident and select only the important ones. In doing so, she/he would demonstrate understanding of the event by selecting the important or salient happenings.

7. __K__ Textbook recall.

8. __C__ The key word here is "example." Although a student could recall an example given by the teacher (which would be a knowledge level behavior) it is assumed his/her comprehension of de facto segregation.

APPLICATION:

The next higher level of the cognitive taxonomy is the application level, where learners adapt information and knowledge to new problematical situations. A general definition for the application level, then, would be the ability to take a problem, idea, principle, or theory and use it in a new situation. Students, in being given a problem or situation which is relatively new, will devise a method of solving the problem according to the information they possess and comprehend. Often at the application level students must first sort out information to decide which information will be applicable in the new situation they are faced with. The application category requires that students possess the knowledge and comprehension of that knowledge, in order to apply it to any situation.

A comprehension level problem requires that students know an abstraction well enough so that they can apply it. Application goes one step beyond. Given a problem new to the student, the student will apply the appropriate abstraction without being told which abstraction to utilize or being shown how to use the abstraction in that specific situation.

Application is applying knowledge to problems in everyday life. This involves the ability to explain ideas through problem solving techniques. Students must be able to develop their own strategies for dealing with new situations, rather than being told which strategy to apply. In classroom situations there are many opportunities for students to develop their problem solving capabilities and to develop their ability to transfer knowledge to new situations.

As we get to the higher levels of the taxonomy--those levels which require more complex behaviors than recall--we enter more and more into the affective domain. Students react to higher level questions according to their own experience. Once a student has comprehended information, he/she has internalized it.

When this occurs, an interplay of the newly comprehended knowledge and experience begins. In this sense, there is more opportunity for interaction between different viewpoints for solving problems.

Examples of behavioral objectives written at the application level would be:

1. Given the instructional technical manual for automobiles, remove and gap the spark plugs of an automobile to the proper setting and replace them with 100% accuracy.

1. (For twelfth grade vocational automotive students) Demonstrate ability to make correct application of technical instructions from manuals on gapping spark plugs, so that when given the instruction technical manual can remove and gap the spark plugs of an automobile to the proper setting and replace them with 100% accuracy.

2. Given ten Ohm's Law problems, apply the correct formula to be used in solving each of the ten problems and solve the problems with 90% accuracy.

2. (For tenth grade basic electronic students) use the application of the Ohm's Law formulas in solving circuit problems, so that when given ten Ohm's Law problems can apply the correct formula to be used in solving each of the ten problems and solve the problems with 90% accuracy.

TEST ON APPLICATION

1. True-False. Application problems can be useful as reinforcers of learning.
2. True-False. Application problems typically have convergent (pre-established) answers.
3. True-False. Application problems can be used to diagnose learning difficulties.
4. True-False. A student can use the correct methods to solve a problem but get the wrong answer.
5. Which of the following reasons would <u>not</u> explain why teachers don't ask more Application level questions?
   a. Application questions require a certain amount of creativity to create a novel testing situation.
   b. Application level behavior often requires passage of a certain time period to ascertain.
   c. Application problems are too hard for most students.
   d. Teachers may not know how to construct either performance objectives or questions at the Application level.

KEY - TEST ON APPLICATION

1. True. Because of the fact that they sometimes are given weeks after the original learning, they demonstrate to the learner that there is value in remembering information. Also, since application problems typically have a "right" answer, the correct solution of the problem for this answer can also be reinforcing.
2. True. Of all the levels above the Knowledge level, the Application category is probably the most convergent.
3. True. Diagnosis of learning difficulties can be facilitated by having students show their work.
4. True. This may be one reason why teachers should ask students to show their work so that partial credit can be given.
5. C

ANALYSIS:

The next highest level in the cognitive taxonomy is the analysis level. Analysis is primarily a deductive approach, but it is also partially inductive since it goes beyond just breaking the subject into component parts.

Analysis calls for the learner to dissect or break the total structure into components. In analysis, the student utilizes the logical thinking process. Arriving at underlying organization or motivation behind a communication would be one type of analysis. The analysis level is more closely related to the evaluation level than to the application level, but one must keep in mind that knowledge, comprehension, and application are all subsumed in the analysis category. Analysis involves looking beneath the surface to discover the interaction and interplay of the various component parts of the general communication.

Performance objectives in the analysis level require the learner to identify component parts of a whole and to understand the relationships and the reasons for the relationships. Analysis is concerned with deriving meaning from information as shown by the learner's ability to understand the components and to understand the interrelation of the components. A general definition for analysis, then, would be the ability to break down material into component parts and to detect the relationship of the parts and the way they are structured. Analysis is used for purposes of clarification of intent and to make the existing relationships between the components more explicit.

The components in an analysis problem can be explicitly stated, value laden, or inferred. The learner should be able to distinguish between these things and should have the ability to distinguish between fact and assumption. The learner should be able to identify which components of the whole are essential to its efficient communication, as well as to analyze the form,

structure and organization of the material or information that is being presented.

Examples of performance objectives at the analysis level would be:

1. Given a television set with a raster but no picture, analyze the problem and list a minimum of four causes of the problem within a five minute period.

1. (For twelfth grade vocational electronic students) Demonstrate ability to analyze malfunctions in television, so that when given a television set with a raster but no picture, will analyze the problem and list a minimum of four causes of the problem within a five minute period.

2. After watching a five minute video tape of a salesperson in action, analyze the situation to determine the factors involved in the loss of the sale with 75% accuracy.

2. (For twelfth grade distributive education students) Demonstrate the ability to distinguish factors in the making of sales, so that after watching a five minute video tape of a salesperson in action, can analyze the situation to determine the factors involved in the loss of the sale.

It should be observed at this point in your reading that the analysis category is a more complex category than the ones which have preceded it. It is the process that is the important concept in analysis, not necessarily whether all the answers agree. Analysis leads to more divergent thinking and responding, and often in analysis there is not just one correct answer.

Some of the verbs that can be utilized in the formation of performance objectives on the analysis level would be to contrast, distinguish, derive, organize, discriminate, differentiate, rationalize, deduce, categorize, and analyze. This is not a complete list and some of these verbs may be used in other categories on a more simple or more complex level.

TEST ON ANALYSIS

1. True-False. Viewing a video taped teaching session and showing how the different parts interrelated to achieve the teaching objective would be an example of an Analysis question.
2. True-False. Students should be given practice in performing the operations involved in analysis before being asked to use them in an Analysis problem.
3. True-False. Analysis questions, because they are difficult, should only be used with brighter students.
4. True-False. One reason Analysis questions give students problems is that they often demand thinking operations which run counter to regular problems.
5. True-False. Analysis questions are totally inappropriate for lower grade children, e.g., grades 5, 6, 7 and 8.
6. Which of the following lists of words is most often associated with Analysis questions?
   a. Define, compare, summarize, interpret.
   b. Evaluate, judge, react.
   c. Classification, motives, assumptions, bias.
   d. Know, memorize.
7. Which explanation best fits the following question, "What assumption might you make about our society from studying the 1968 Vocational Amendments?"
   a. This is a Comprehension question which asks for an interpretation of our society.
   b. This is a complex fact question asking if the needs and values of

society are in fact, reflected in the 1968 Amendments.

c. This is an Analysis question requiring students to examine the 1968 Vocational Education Amendments and draw conclusions about the society.

d. This question cannot be classified into any category.

KEY - TEST ON ANALYSIS

1. True. Note that the question included showing the interrelationship of parts. If it had just asked the student to identify different parts, it would be a Comprehension exercise.
2. True. This may be especially for this category as it isn't often given that much attention in our schools.
3. False. All people in a democracy can benefit from practice in logical thinking and being able to understand how communication works to influence people's thinking.
4. True. Often the operations asked for in an Analysis question are just the reverse of those normally encountered, i.e., the student is asked to "take apart" rather than put together a communique.
5. False. The reverse is true. However, a teacher must carefully plan activities which lead to the desired analytic competencies.
6. C
7. C

SYNTHESIS:

The next highest level of the cognitive taxonomy is synthesis. Bloom defines synthesis as the "putting together of elements and parts so as to form a whole." The synthesis category is one which could be referred to as the level of understanding designed for creativity. Uniqueness, originality, or imagination in the production of a product would be designated as synthesis. In the sense that a whole is being created from component parts, learners do not have to create something totally new to all, but only new to themselves. When the learner is involved in the synthesis process, a combination of parts in such a way as to constitute a pattern or a structure not clearly there before, is created.

Operations at the synthesis level involve creativity. Because of this, it is more difficult to objectively measure a synthesis level evaluation component. It is at the synthesis level, therefore, that the teacher is required to use subjective judgment more frequently.

Bloom differentiates the sub-categories of Synthesis according to product. In one sub-category, one may view the product or performance as a unique type of communication. A poem, essay or speech would be an example of this sub-category. Usually authors try to communicate certain ideas and experiences to others. Usually, too, they try to communicate for one or more of the following purposes: to inform, to describe, to persuade, to impress, or to entertain. Ultimately, they want to achieve a given effect (response) in some audience. The particular medium of expression chosen, together with its forms and conventions, is selected to optimally convey certain ideas and experiences.

The product, or outcome of the Synthesis, can be considered "unique" in at least two respects. First, it does not represent a pre-established set of

operations or specifications to be carried out, except perhaps in the narrow sense of furnishing an expressive design which may be interpreted and performed by an individual or group, as in the reading aloud of poetry, the presentation of a play, or the performance of a musical composition. In other words, the task was planned by the instructor so as to provide room for creativity. Secondly, the product is partially evaluated on its divergence; therefore, students are encouraged to add their own personal contributions to the product.

The second sub-category of the Synthesis level involves the production of a plan or proposed set of operations to be carried. out. Bloom illustrated this sub-category as follows:

Proposed Set of Operations	Process--i.e., carrying out the set of operations	Expected Outcome
Plan for an experiment	Carrying out the experiment	Experimental findings; probability statement
A teaching unit	Teaching	Changes in behavior
Specifications for a new house	Building the house	The house

Note how all of these operations result in the production of a tangible product. This tangible product, plus the quality of creativity, are the two distinguishing characteristics of the Synthesis level. Many times, because of resource limitations in our schools, the actual final product cannot actually be constructed or built. Consequently, we judge the quality of the Synthesis operation on the basis of the plans themselves. This sub-category differs from the previous one in that the product is more tangible and, therefore, sometimes easier to evaluate. Teachers generally feel more comfortable evaluating a project or project plans than an "original" art form.

The third sub-category has as its product of Synthesis a set of abstract relations. This set of relations may be derived from an analysis of certain

observed phenomena. Included here may be the formulation of hypotheses, which are guesses or hunches about potentially fruitful directions for research. Also included in this sub-category would be the formulation of generalizations or principles. The Peter Principle[4] would be an example here. (The Peter Principle states that in an organization, people advance or are promoted until they unknowingly--at least before the Principle was formulated--reach their level of incompetency.)

Verbs commonly used in synthesis type performance objectives would be to construct, write, compose, organize, tell, relate, create, design, transmit, perform, originate, predict, modify, develop, formulate, or synthesize. This is not a complete list, but one that the writer of performance objectives at the synthesis level can utilize in creating objectives.

Examples of performance objectives at the synthesis level would be:

1. (For twelfth grade vocational electronics students) Given instructions to design and build a 5 watt or greater amplifier, the students will be able to analyze the problem and creatively design the amplifier and build a working model with a measurable output of 5 watts or more.

2. Analyze soil, slope and drainage of an 80 acre field and determine amount of and kinds of soil nutrients required to produce a crop(s) which insures highest possible yield and long range profit.

It should be observed at this point in your reading that synthesis objectives are similar to and extend from objectives involving knowledge, comprehension, application, and analysis. They are more complete, perhaps, and require more originality. Synthesis allows the student to create a product with no limitation upon the resources utilized. Because of this, it is necessary that students working in the synthesis category should be given a wider degree of freedom in which to work and the end result (product) should be subjectively judged.

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[4] Laurence Peter and Raymond Hull, Peter Principle, (Des Plaines, IL: Bantam Books, Inc., 1970).

TEST ON SYNTHESIS

1. True-False. Synthesis operations cannot be evaluated.
2. True-False. Some subjects are more amenable to Synthesis activities.
3. True-False. A student coming up with or discovering a principle or rule unknown to him/her before would not be operating at the Synthesis level.
4. True-False. The main difference between Application and Synthesis is in the degree to which the answer is pre-specified.
5. True-False. Students probably should be helped in preparing to write Synthesis answers.
6. True-False. A Synthesis activity as defined by the Taxonomy is not totally attributable to creativity.

KEY - TEST ON SYNTHESIS

1. False. They can be and should so as to provide feedback to the student. Care should be taken, however, not to stifle personal initiative and creativity.
2. True. Some subjects such as the humanities and liberal arts are more amenable to Synthesis activities, but even science and math can be used to elicit student creativity.
3. False. Here is where teacher subjectivity comes into play. If the process that the students used to arrive at the product was their own and if the product was truly new to the students, then we would consider this a Synthesis operation.
4. True. Application usually has a pre-determined answer in mind.
5. True. Creativity may not have been encouraged by earlier learning experiences. Also, students should be shown how they can use the lower categories as foundations for Synthesis operations.
6. True. There are many prerequisite types of skills or levels which must first be mastered. Leonardo da Vinci did not start out by painting "The Last Supper" but rather practiced for years before executing this famous work.

EVALUATION:

The highest level of the cognitive taxonomy is evaluation. Evaluation is the rendering of judgments and opinions based on certain criteria. To respond to objectives written at the evaluation level, the student must set up criteria for judgment and then determine how closely the material examined coincides with this predetermined criteria. The evaluation category of understanding requires the ability to use the five lower classifications of the taxonomy plus quantitative or qualitative evaluation or judgment. The major difference between evaluation levels of understanding and synthesis levels of understanding is that evaluation requires the use of criteria and/or opinion. Assessment of the value or quality of something implies that predetermined criteria has been established for the judgment rendered.

Facts, opinions, or values are criteria which can be used for assessment. Facts can be proved to be true or false. Opinions are impressions based on intuition rather than on knowledge. Values, although difficult to prove true or false, are deemed to be important and indicate a commitment to an idea. Subjective judgment, then, would coincide with values or opinions. Objective judgment would be more closely based on knowledge (facts).

A general definition of the evaluation category would be the ability to make judgments about the quality of something by using appropriate criteria. The ability to make comparisons of material or indicate fallacies in arguments would also be included in the evaluation category.

Verbs used in the evaluation category would be to argue, prove, assess, judge, evaluate, solve, appraise, compare, contrast, validate, or criticize. Two possible performance objectives written on the evaluation level would be:

1. Given a symptom of a medical problem, possible solutions, and six facts about the symptoms, the student will explain in writing a solution and conclusions used in arriving at the solution.

1. (For post-secondary nursing students) Make logical conclusions for medical problems, so that when given a symptom of a medical problem, possible solutions, and six facts about the symptoms, the student will explain in writing a solution and conclusions used in arriving at the solutions.

2. Given a piece of metal with a butt weld and one with a filet weld, the student will compare the two welds and contrast them to deduce the advantages of each.

2. (For twelfth grade welding students) Demonstrate ability in evaluation and selection of appropriate times to use butt and filet welds so that, when given a piece of metal with a butt weld and one with a filet weld, the student will compare the two welds and contrast them to deduce the advantages of each.

TEST ON EVALUATION

1. True-False. An Evaluation question can be put in a T or F or multiple choice format.
2. True-False. Teachers should not grade Evaluation answers because of their subjective nature.
3. True-False. Evaluation questions probably should not be used at the beginning of the year.
4. (Fill in the blank) Creativity is to _____ as judgment is to Evaluation.
5. Which two categories in the Taxonomy deal most with subjective responses? Which two categories in the Taxonomy deal least with subjective responses?

KEY - TEST ON EVALUATION

1. False. This does not give the student opportunity to establish criteria and apply them to some criteria.
2. False. The teacher can still give feedback on how well the criteria are used to judge the issue.
3. True. If the Taxonomy is hierarchical, then the students should be led through the lower steps first. If Evaluation questions are used in the beginning, the teacher should make clear exactly what is expected of the students.
4. Synthesis
5. Most: Synthesis and Evaluation

   Least: Knowledge and Application in that the answers are predetermined and convergent.

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